



DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

H2 Refuel H-Prize Final Guidelines

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy (DOE).

ACTION: Notice of the H2 Refuel H-Prize Competition.

SUMMARY: As authorized in Section 654 of the Energy Independence and Security Act of 2007, the Department of Energy (DOE) is announcing the \$1 million H2 Refuel H-Prize competition, allowing teams from across the United States to compete and develop systems that generate and dispense hydrogen from resources commonly available to residences (electricity or natural gas), for use in homes, community centers, businesses or similar locations, to supplement the current infrastructure roll-out and reduce barriers to using hydrogen fuel cell vehicles.

DATES:

- Competition opens - **October 29, 2014.**
 - Competition ends - **October 31, 2016:** Data will be analyzed to determine winner
- Award of \$1 million prize, if the Panel of Judges determines that there is a winning entry.

For more information regarding the dates relating to this competition, see, section III.,

Competition requirements and process, Key Dates, in the **SUPPLEMENTARY**

INFORMATION section of this notice.

ADDRESSES:

The H-Prize website is <http://hydrogenprize.org>, where updates and announcements will be posted throughout the competition.

FOR FURTHER INFORMATION CONTACT:

Questions may be directed to--

Technical information: Reginald Tyler at 720-356-1805 or by email at HPrize@ee.doe.gov

Prize contest: Emanuel Wagner, Contest Manager, Hydrogen Education Foundation, at 202-457-0868 x360 or by email at EWAGNER@ttcorp.com.

SUPPLEMENTARY INFORMATION:**I. Introduction**

Fuel cells powered by hydrogen from renewable or low-carbon resources can lead to substantial energy savings and reductions in imported petroleum and carbon emissions. Fuel Cell Electric Vehicles (FCEVs) are much more efficient than today's gasoline vehicles, and when fueled with hydrogen, produce only water vapor at the tailpipe. The hydrogen fuel can be generated from a range of domestic sources. While the commercial sale of FCEVs is rapidly approaching, infrastructure remains a major challenge, with only approximately 50 fueling stations in the United States, only 10 of which are operating as public stations.

The H-Prize was authorized under section 654 of the Energy Independence and Security Act of 2007 (Pub. L. 110-140). As efforts to build a hydrogen fueling station infrastructure are getting underway, the H2 Refuel H-Prize is intended to incentivize the development of small-scale systems for non-commercial fueling to supplement the larger-scale infrastructure development.

The H₂ Refuel H-Prize anticipates award of a \$1 million prize to the top refueler system entry that can produce hydrogen using electricity and/or natural gas, energy sources commonly available to residential locations, and dispense the hydrogen to a vehicle, providing at least 1 kg per refueling. Systems considered would be at the home scale and able to generate and dispense 1-5 kg H₂/day for use at residences, or the medium scale, generating and dispensing 5-50 kg H₂/day. Medium scale systems would serve a larger community with multiple users daily, such as a large apartment complex or retail centers to fuel small fleets of vehicles (e.g., light duty automobiles, forklifts or tractors).

Interested parties can register and find more information, updates and pages where teams can discuss the prize at the H-Prize website: <http://hydrogenprize.org>. The Hydrogen Education Foundation (HEF) is currently administering the prize for the U.S. Department of Energy (DOE), and DOE will coordinate prize activities with HEF.

Teams will have a year to design a system that generates and dispenses hydrogen fuel that meets the criteria and identify a location where it can be installed and used. Twelve months after the competition opens, teams will be required to complete registration and submit system designs and blue prints, plans for installation, and preliminary data to demonstrate that the system satisfies the minimum criteria (see Criteria section). Teams will also need to provide documented evidence of cooperation from the installation site. Of the teams that meet all of the minimum criteria, the top entries will be selected as finalists to enter the testing phase. The selected teams will then have seven months to install and begin operating their systems. The systems must be compatible with remote monitoring equipment to allow remote monitoring for the testing period; compatibility requirements will be posted on the H-Prize website. Starting 21 months after the competition opens, the finalist systems will be remotely monitored and tested, and approximately two months of data will be collected. At least one on-site visit will be performed to verify data and perform tests that cannot be done remotely. Teams must also provide requested information to a DOE designated entity for independent verification of the cost of the system and the cost of the generated hydrogen. The scoring criteria will be ranked and weighted.

Proposed Timeline

Current tentative date	Activity
March 2014	Draft Guidelines posted for public comment
April 2014	Comment period closes
October 2014	Competition opens H-Prize Website opens, including an online system to facilitate teaming and partnerships Teams design systems, collect data, identify installation location, and registers for the prize ahead of data submission deadline
October 2015	Preliminary data submission deadline Teams will submit data, provide designs and blueprints and information about installation site, to indicate that the system is capable of meeting the base criteria
December 2015	Finalist teams are announced – go to testing stage Finalist Teams install systems and get them up and running Before the testing period begins, remote monitoring equipment will be installed by the designated data analysis team
July 2016	System testing begins
October 2016	Competition ends – data is analyzed to determine winner
December 2016 (tentative)	Anticipated winner announcement

II. Prize criteria and testing

Finalist selection phase

Twelve months after the competition opens, teams interested in competing must have completed registering for the competition and submit all required information. To be considered, an entry must meet the initial selection criteria defined below. Teams will be required to submit data that demonstrates the system's ability to meet the indicated criteria. The top teams to provide convincing evidence that the entry could satisfy the minimum criteria will be selected for testing. Specific instructions will be posted on the H-Prize website detailing the required information. In addition to the required technical criteria data, teams will submit system descriptions and preliminary designs and installation concepts which will be evaluated by an expert panel to determine if the entries are likely to meet reasonable usability, cost and safety criteria. Usability refers to the ability of the system to be installed and used at the intended locations (e.g., considering footprint and noise), and to be easily operated by the average user (e.g., with minimum training and time). Because a goal of the H-Prize is to advance commercial applications of hydrogen energy technologies, the potential of the systems to ultimately be commercialized will also be evaluated, and a description of a pathway to commercial production of the systems, including manufacturing, will be requested. To evaluate the potential safety of the system, certain information will

be requested, including a safety plan and a hazard analysis; specific instructions will be available at the H-Prize website. A safety page on the H-Prize website will provide updated information on safety issues and requirements for the safety plan and hazard analysis. To be selected as a finalist, contestant designs, installation details and safety plans must be judged adequately safe by a panel of safety professionals.

Minimum/Maximum Criteria Table

Criteria	Home	Community
Minimum dispensing pressure	350 bar	
Maximum dispensing time (standard fill)	10 hours	60 minutes
Min. hydrogen dispensed per day	1 kg	5 kg
Hydrogen purity	Meets SAE J2719 (Hydrogen Fuel Quality for Fuel Cell Vehicles)	
Fill method	Compliant with relevant codes (for automobiles, SAE J2601 Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles) and ensures that delivered hydrogen does not exceed the pressure and temperature limits of the vehicle storage tank.	
Safety	Meets relevant safety codes and standards for installation in target location	

Finalist competition

The finalist teams will have seven months to install their systems at a location of their choosing before testing begins. Among other considerations, entries must meet the safety codes and standards in effect at the installation location appropriate to the system. Further, all required permits and approvals must be received prior to system operations.

Each entry will be scored in six different technical and cost criteria:

- Dispensing pressure
- Dispensing time
- Number of standard fills per day
- Tested availability
- Total installed system cost
- Direct user cost per kg

The criteria and scoring ranges are listed in more detail below.

Testing for the technical criteria will be performed remotely over a period of 2 to 3 months, with at least one on-site inspection to verify data and perform testing that cannot be done remotely. Summary level testing results will be published. The base criteria listed in Minimum/Maximum Criteria Table will be tested to ensure that all entries meet those requirements. A standard fill is defined as the delivery of 1 kg of hydrogen to a vehicle tank.

The cost criteria will be evaluated by an independent auditing entity. Teams will be required to submit cost information, such as the bill of materials for the system installation and system operating costs during the testing period. Specific details on required information will be provided to finalist teams after selection.

Entries will receive scores for the tested criteria as described below, with different multipliers for each of the criteria. When testing is complete, the data will be analyzed to determine scores. Once all results have been analyzed, judges will evaluate the results and determine the scores based on the published scoring criteria, and confirm entry eligibility based on the base criteria and eligibility requirements. After resolving any ties (see tie resolution process below), the eligible team with the highest score will be the winner.

Installation site criteria

Any site in the 50 United States and the District of Columbia can be used for the installation of the refueler, as long as there is access for installing equipment for remote monitoring, at least one on-site visit for in-depth testing, and at least one visit by the press and public.

To meet testing requirements, the fueling system should be used at an average of at least 50% planned capacity per week (e.g., for a home system designed to dispense 1 kg/day, at least four 1-kg “fills” per week; for a community system designed to produce 20 kg/day, it should dispense at least 70 1-kg “fills” per week). If on-site use is below this level, simulated fills can be used for testing. Simulated fill protocols will be posted on the H-Prize website before testing begins.

Entries must meet the safety codes and standards in effect at the installation location. Teams are encouraged to consider the relevant SAE, ASME and NFPA codes and standards.¹

Prize criteria

The criteria were developed through discussion with experts in the field, including members of Hydrogen and Fuel Cell Technical Advisory Committee, other DOE offices, and federal agencies, and from responses to a Request for Information (DE-FOA-0000907: RFI - Home Hydrogen Refueler H-Prize Topic, http://www1.eere.energy.gov/financing/solicitations_detail.html?sol_id=600) and public comments on the draft criteria (79 FR 15737).

Each of the criteria is assigned a 1-5 point scale connected to different ranges. To be eligible, entries must receive at least the minimum score for each category. For some criteria, the ranges for home and community systems may be different. A score multiplying factor will be used to weight the different criteria.

Dispensing Pressure		
Score	Home	Community
1	350 bar or higher	
2	400 bar or higher	
3	500 bar or higher	
4	600 bar or higher	
5	700 bar or higher (ultimate goal)	

Dispensing Pressure refers to the pressure of the hydrogen dispensed to the vehicle. Intermediate pressures are listed to incentivize advancements towards low-cost systems that can meet the ultimate target of 700 bar.

Dispensing time

¹ Codes and standards to consider include but are not limited to SAE J2719, ASME B31-12, ASME B31-3, ASME BPV Code, NFPA 2 and NFPA 70. Depending on the system, some codes and standards may not apply.

Score	Home	Community
1	10 hours/kg or less	60 minutes/kg or less
2	8 hours/kg or less	30 minutes/kg or less
3	5 hours/kg or less	15 minutes/kg or less
4	2 hours/kg or less	10 minutes/kg or less
5	30 minutes/kg or less	3 minutes/kg or less

Dispensing time is the time required to dispense a standard fill of hydrogen to a vehicle, including time required to connect the system to the vehicle and begin the hydrogen flow. Home systems may have longer fueling times, up to overnight, while multi-user system are expected to have shorter fueling times.

Number of standard fills per day		
Score	Home	Community
1	1 or more	5 or more
2	2 or more	10 or more
3	3 or more	20 or more
4	4 or more	40 or more
5	5 or more	50 or more

The standard fills per day will be based on the highest number of actual or simulated fills completed in a 24 hour period.

Tested Availability		
Score	Home	Community
1	80% or higher	
2	85% or higher	
3	90% or higher	
4	95% or higher	
5	98% or higher	

Availability will be tested over a period of two to three months, during which time system usage will need to be at least 50% of the planned capacity per week. Any time spent on repairs or non-routine maintenance during the testing period will count as non-available, even if compensated for (e.g., repairs done during scheduled down-time, or using stored hydrogen).

Total Installed System Cost (capital + installation)

Score	Home	Community
1	\$25k/kg/day or less	\$15k/kg/day or less
2	\$20k/kg/day or less	\$12.5k/kg/day or less
3	\$15k/kg/day or less	\$10k/kg/day or less
4	\$10k/kg/day or less	\$7.5k/kg/day or less
5	\$5k/kg/day or less	\$5k/kg/day or less

Total Installed System Costs will be based on the actual cost for the system equipment (including balance of plant to the nozzle interface) as well as the actual installation costs. The total cost for scoring will be based on the amount of hydrogen dispensed per day – for example, a home system designed and demonstrated to dispense 1 kg/day with a system installed cost of \$24,000 would score 1 point, while a system designed to dispense 2 kg/day at the same cost would receive a score of 3. Teams will be expected to provide information such as the bill of materials for all components. Details of the specific information requested will be provided to the teams selected for testing. If the system proposed provides heat and/or power in addition to hydrogen for refueling, the cost of the entire system will be considered when scoring this criterion. Integrated systems that provide heat and/or power in addition to hydrogen for refueling will be awarded bonus points (see bonus points below).

Direct user cost per kg		
Score	Home	Community
1	\$20 or less	
2	\$17 or less	
3	\$14 or less	
4	\$11 or less	
5	\$8 or less	

Direct user cost per kg will be based on feedstock inputs and actual operations and maintenance costs during the testing period, divided by the amount of hydrogen that is produced and used. The direct user cost per kg excludes the capital and installation costs, which are included in the total installed system cost category. Feedstock cost inputs will be based on actual usage, using a single price for all entries for each input to eliminate regional variation, based on the EIA 2014 projections for average price to all users: \$0.098/kWh for electricity and \$6.60/million BTU for natural gas. All generated and used hydrogen is

counted in determining the \$/kg – for example, a system that generates 10 kg/day, where 4 kg is used for fuel vehicles and 5 is used in a fuel cell to produce power would divide the daily user costs by 9.

Scoring

Criteria Category	Score multiplier
Dispensing pressure	3
Dispensing time	1
Standard fills per day	1
Tested Availability	2
System installation cost	2
Direct user cost per kg	1

A bonus score of up to 3 points will be awarded for integrated systems in order to offset the additional costs associated with adding heat and/or power, based on how much heat or power is provided.

Bonus points	
Points	Heat or power supplied
1	Supply at least 35 gallons of hot water per day
1	Supply at least 25,000 BTU/hr of space heating
1	Supply at least 10 kWh electricity per day

Scoring example

Example A: Makes all the lowest scores

Criteria Category	Result	Category Score	Score multiplier	Total scores
Dispensing pressure	360 bar	1	3	3
Dispensing time	8 hours	1	1	1
Standard fills per day	1	1	1	1
Tested Availability	81%	1	2	2
System installation cost	\$23k/kg	1	2	2
Direct user cost per kg	\$19/kg	1	1	1
Bonus categories	None	0	0	0
Total	--	--	--	10

Example B: Mixture of scoring levels

Criteria Category	Result	Category	Score	Total scores
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		Score	multiplier	
Dispensing pressure	475 bar	2	3	6
Dispensing time	3 hours	3	1	3
Standard fills per day	3	3	1	3
Tested Availability	88%	2	2	4
System installation cost	\$18k/kg	2	2	4
Direct user cost per kg	\$11/kg	4	1	4
Bonus categories	Supplies hot water	1	--	1
Total	--	--	--	25

Judging and testing

A panel of independent judges will be assembled from experts in relevant fields, selected by DOE in consultation with HEF. Judges may be selected from organizations such as the Hydrogen Safety Panel, the Hydrogen and Fuel Cells Technical Advisory Committee, National Labs, and relevant federal agencies. An independent testing entity will be selected to perform remote and on-site technical data collection, and an independent auditing oversight entity will collect and analyze the cost data.

Tie resolution process

If the results for any of the technical criteria for different entries differ by less than the measurement error range, then those systems will be considered tied for that category and given the higher of the two scores (for example, if the pressure measurement error range is 5%, and Entry A has a dispensing pressure of 499 bar and Entry B has a pressure of 500 bar, both will be given 3 points for the category).

If the top entries' total scores are tied, the entry with the highest measured pressure will win; if the pressure measurements are within the measurement error, the entry with the highest measured availability will be selected as the winner. Otherwise, the entry with the highest score will win.

III. Competition requirements and process

Eligibility

This H-Prize Competition is open to contestants, defined as individuals, entities, or teams that meet the following requirements:

1. Comply with all Registration and H-Prize Competition Rules and Requirements as listed in this document and in any updates posted on the H-Prize website and/or the **Federal Register**;
2. In the case of an entity: be organized or incorporated in the United States, and maintain for the duration of the H-Prize Competition a primary place of business in the United States;
3. In the case of all individuals (whether participating singly or as part of an entity or team): be a citizen of, or an alien lawfully admitted for permanent residence into, the United States as of the date of Registration in the H-Prize Competition and maintain that status for the duration of the H-Prize Competition;
4. A team may consist of two or more individuals, entities, or any combination of both. All team members listed on the contestant roster must meet the requirements of individuals or entities.
5. Provide the following documentation:
 - a. In the case of U.S. Citizens: provide proof of U.S. Citizenship with Registration, as follows:
 - i. Notarized copy of U.S. Passport, or
 - ii. Notarized copies of both a current state-issued photo ID issued from one of the 50 States or a U.S. Territory and a birth certificate;
 - b. In the case of aliens lawfully admitted for permanent residence in the United States: Provide notarized copy of Permanent Resident Card (Form I-551)(green card) with Registration;

- c. In the case of entities: Provide a copy of the entity formation documentation (e.g. Articles of Incorporation) showing the place of formation, as well as a self-certification of the primary place of business;
6. The contestant, or any member of a contestant, shall not be a Federal entity, a Federal employee acting within the scope of his or her employment, or an employee of a National Laboratory acting within the scope of his or her employment;
7. Sign a waiver of claims against the Federal Government and the HEF. *See* 42 U.S.C. 16396(f)(5)(A);
8. Obtain liability insurance, or satisfactorily demonstrate financial responsibility, during the period of the H-Prize Competition. *See* 42 U.S.C. 16396(f)(5)(B)(i);
9. Name the Federal Government as an additional insured under the registered participants' insurance policy and agree to indemnify the Federal Government against third party claims. *See* 42 U.S.C. 16396(f)(5)(B)(ii);
10. Teams and Entities:
 - a. Each team or entity will designate a team leader as the sole point of contact with H-Prize Competition officials.
 - b. Team or entity members will be identified at the time of Registration on the contestant roster. Members participating on multiple teams will be required to disclose participation to each team.
 - c. Changes to contestant rosters will be allowed up to 72 hours prior to the award presentation, provided citizenship and immigration requirements are met.

Registration process

After announcement in the **Federal Register**, registration and all required eligibility documentation must be completed through the web site <http://hydrogenprize.org> no later than one week before the initial data submission deadline. Early registration is encouraged.

H-Prize Competition Schedule

Once registered, teams will receive all notices and rules updates, including answers to questions asked by the contestants. The public web site, <http://hydrogenprize.org>, will also post this same information, including publicity about various teams and sponsors. Contestants are encouraged to utilize the web site as a means of highlighting any information they would like to convey to the public or potential sponsors. There are no entry fees.

On **October 29, 2015**, contestants will be required to submit initial data (including information on how the data was gathered and measured) and requested financial information for evaluation by a designated panel of judges. Instructions for the initial data submission will be posted on the web site and sent electronically to the designated contact person for each contestant.

Testing and evaluations are planned to be completed in October 2016. The winner will be determined after all testing data has been analyzed to determine scoring and any ties resolved as described above. DOE plans select and announce a winner within three months after the close of the competition.

Intellectual property

Intellectual property rights developed by the contestant for H-Prize technology are set forth in 42 U.S.C. 16396(f)(4). No parties managing the contest, including the U.S. Government, their testing laboratories, judges or H-Prize administrators will claim rights to the intellectual property derived by a registered contestant as a consequence of, or in direct relation to, their participation in this H-Prize Competition. The Government and the contestant may negotiate a license for the Government to use the intellectual property developed by the contestant.

Cancellation and team disqualification

A contestant may be disqualified for the following reasons:

- At the request of the registered individual or team leader;
- Failure to meet or maintain eligibility requirements (note that at the time of the prize award, if it is determined that a contestant has not met or maintained all eligibility requirements, they shall be disqualified without regard to H-Prize Competition performance);
- Failure to submit required documents or materials on time;
- Fraudulent acts, statements or misrepresentations involving any H-Prize participation or documentation; or,
- Violation of any federal, state or local law or regulation.

DOE reserves the right to cancel this prize program at any time prior to the completion of system testing.

Liability and competition costs

The Department of Energy, H-Prize, the Hydrogen Education Foundation and any sponsoring or supporting organization assume no liability or responsibility for accidents or injury related to the Prize.

The entrants are responsible for costs associated with participating in the competition including but not limited to designing, installing and operating their systems.

Key Dates

- **October 29, 2014:** Competition opens
- **October 29, 2015:** Preliminary data submission date
- **July, 2016:** Finalist system testing begins
- **October 31, 2016:** Competition ends, data will be analyzed to determine winner Award of \$1 million prize, if the Panel of Judges determines that there is a winning entry.

- **December, 2016:** Anticipated award of \$1 million prize, if the Panel of Judges determines that there is a winning entry.

IV. Draft guideline public comments and responses

Draft guidelines for the H₂ Refuel competition were posted online March 21, 2014, as announced in the **Federal Register** at 79 FR 15737. Responses were submitted from 14 sources, representing industry, consultants, safety groups, competition experts and individuals, and some responses covered multiple topics.

Comments on criteria

There were four comments that addressed the contest scoring criteria and their targets. One stated the opinion that economy of scale is the only way to overcome fueling costs and suggested raising the minimum required fueling capacity. In response, DOE notes that the criteria for fueling capacity in the draft guidelines for the small, “Home” category, 1-5 kg H₂/day and for the medium “Community” category, 5-50 kg H₂/day were identified with several goals and issues in mind. The requirements for the minimum daily amount of hydrogen dispensed were designed to fit with the intended applications in the immediate near-term, which is either home or small-scale, non-commercial multi-use sites such as a community. These applications would serve a small number of vehicles, for which DOE determined the minimum capacity for hydrogen dispensed. The minimum is only a lower limit, though, and entries would be allowed to design systems capable of higher fueling capacities, within the range of the “Home” and “Community” category definitions. Therefore, the minimum requirement for hydrogen dispensed daily will not be changed.

A second response noted that capital cost should be expressed in terms of capacity, and stated that there was confusion in having a separate scoring of refuels per day. In response, DOE changed the text and tables to clarify that the capital cost is in units of “\$/kg hydrogen dispensed per day.” The refuels per day criteria allows testing that the entire system can actually produce and deliver the targeted amount of hydrogen per day. While the upper limit of this would be determined by the fueling time, which is a separate criteria, it would also be affected by other issues. For example, a system may be able to rapidly fuel a vehicle in 10 minutes, but not be able to produce more than 5 kg/day; this also tests that the system can handle repeated fuelings in a day.

Another response noted that refueling time was heavily weighted in the draft scoring criteria, given that two categories relate to it, one with a 2x score multiplier. The commenter suggested that this went against the concept of a home refueler, where the idea is to refuel overnight to a full tank, and takes emphasis away from more important issues like direct user costs. DOE notes that the comment reflects some confusion over the refueling time criteria - the refueling time is for a single kg of hydrogen; and fill a car tank overnight would likely require more than one kg of hydrogen, so such a system would actually score in the mid- to high-range under the draft guidelines. In response to the comment, the difference between the refueling time and refuelings per day criteria was clarified in the final guidelines, and the weight for the dispensing time score was reduced.

One response stated that the home refueler systems should be at 700 bar, which has been adopted as the standard onboard storage pressure by car manufacturers. DOE notes that the dispensing pressure criteria were given considerable thought, and some responses to an earlier Request for Information addressed the selection of a 700 bar or 350 bar system. The ultimate target is a 700 bar system, but given the current state of the technology in combination with the other criteria, limiting the dispensing pressure to 700 bar could severely restrict potential entrants. The scoring for dispensing pressure is designed to incentivize the design of systems that improve upon the 350 bar dispensing pressure, and the dispensing pressure requirements will not be changed. While a 350 bar system cannot fully fill a 700 bar tank, it can still

partially fuel a tank, providing at least enough hydrogen for an average day's commute. The intent of the competition is to supplement the fueling infrastructure, not replace it.

Comments on system and entrant eligibility

Four comments included questions about whether certain systems would be qualified as entries for the competition. One asked about systems that produce but do not dispense hydrogen. The DOE notes that because the goal of the competition is to develop onsite refueling systems, the guidelines require systems to both produce and dispense hydrogen onsite. Another asked about systems that have already been built and installed. DOE notes that as the competition is intended to stimulate improvements over the currently available technology, and that the targets have been set, based on available information, such that no current system meets all criteria simultaneously. Nothing in the guidelines, however, excludes such a system. All requirements would still apply to existing systems, including providing the relevant financial information such as bill of materials. A third comment provided some information about a hydrogen production system, and asked if configurations other than electrolysis or steam reforming of natural gas would be accepted. The final competition guidelines do not specify the technology for hydrogen production and are not limited to the use of electrolysis or steam methane reforming. However, any system must meet the requirements laid out in the guidelines, including that the feedstocks and major consumables used be those commonly delivered to residences (electricity, natural gas), and dispense the hydrogen in addition to generating the fuel. The fourth comment asked if a system that fuels vehicles with hydrogen internal combustion engines, rather than fuel cells, would be allowed. DOE notes that the guidelines do not specify the type of vehicle used, however, the testing stage must use a tank that is compatible with the minimum system criteria (e.g., can receive at least 1 kg of hydrogen in a fueling, is compatible with hydrogen delivered at 350 bar). It is expected that questions about whether certain systems would qualify will continue to be relevant, and while the guidelines were not altered, general questions will be addressed in the FAQ page of the H-Prize website.

Two comments requested clarification of who is eligible to compete. One asked if educational institutions would be allowed to be part of a team, and another noted that the eligibility criteria was unclear in some sections, particularly with reference to teams. In response, DOE has refined and modified the eligibility criteria to clarify many of the issues that were identified in comments, with more consistent use of the terms “entity,” “team,” and “participant.” The reference to “private entity” was changed to “entity.” An educational institution would be considered an entity, and would be eligible if it met the other eligibility requirements (e.g., organized or incorporated in the United States). DOE expects that questions of eligibility will continue to be common. While some of the questions may need to be addressed on a case-by-case basis, more common questions will be addressed on the FAQ page of the H-Prize website.

Information on hydrogen production systems

Three responses provided information on hydrogen production systems, without commenting directly on the draft guidelines. DOE used the information provided about relevant systems to further evaluate the criteria to ensure that they were achievable but represent an improvement over the current state of the technology. The responses suggested that the criteria identified were, in fact, achievable but not yet attained.

Competition plans

Several responses addressed the plans for the competition. One noted that the testing period was not well described and should reflect real-world conditions, specifically fueling into tanks that are not empty. DOE notes that as stated in the guidelines, further details of the testing protocol will be provided to contestants by the prize administrator. DOE had considered more complicated testing procedures, however, given the potential diversity of system designs (for example, they may have different dispensing pressures), and the added cost and time associated with implementing more complicated protocols and verifying that they are performed, lead to the selection of the current protocols. Another response commented on the general plans, suggesting that to engage a robust set of entries, the eligibility requirements for insurance and waivers be waived until after the selection of finalists. DOE notes that insurance and liability waivers are

required by the Energy Independence and Security Act of 2007, Pub. L. 110-140 (42 U.S.C. 16396(f)), and those requirements for registration will remain in the guidelines. The same response also recommended the use of modern engagement methods, such as involvement with social media in addition to the website. Both DOE and HEF have plans to ensure that the competition is widely advertised, including the use of social media and other engagement activities.

One comment asked when a forum to help teams find partners would be available. DOE notes that the H-Prize website will provide opportunities for those interested in joining a team to reach others. For example, interested parties will be able to submit information to HEF, which will post the lists of those with interest in teaming, with no implied endorsements or guarantees, on the website or in newsletters. Though an online forum was initially considered and noted in the draft guidelines, other methods of communication have since been determined to be more effective and the guideline language was changed accordingly.

One response asked if funding is available to design and/or build the entries. DOE notes that, as stated in both the draft and final guidelines, “The entrants are responsible for costs associated with participating in the competition including but not limited to designing, installing and operating their systems.” The H-Prize is a competition, and no up-front funding is provided through the competition itself. It is expected that this will be a common question, and will be addressed in an FAQ page on the H-Prize website.

One response asked about when final guidelines would be posted. DOE notes that the final guidelines are posted in this Federal Register notice. Further details can be found in this notice and on the H-Prize website.

Three responses suggested changes to the competition that are not compatible with the Energy Independence and Security Act of 2007, Pub. L. 110-140 (42 U.S.C. 16396(f)). One suggested allowing synthetic methane as an alternative to the hydrogen fueling; however, DOE notes that the H-Prize statutory authority states that the prize is intended to advance the research, development, demonstration, and commercial application of hydrogen energy technologies. Fueling with methane would not qualify as

a hydrogen energy technology, and therefore the guidelines will not be changed to include methane or other fuels besides hydrogen. Two other responses suggested having separate awards for different categories, either the “home” or “community” or a set of three categories based on scale and application. The combination of single-home and community scale systems provides entrants with the flexibility to match their solution to the general topic of small-scale, non-commercial fueling while the parallel target ranges for certain criteria allows the two scales (single user vs. multiple user) to be more evenly compared based on their expected application.

Safety

One comment was also submitted on issues related to safety, codes and standards. In response, DOE engaged in discussions with safety experts, including the respondents. The comments and discussions lead to several modifications of the competition guidelines and plans. These include the addition of a safety plan and hazard analysis to the documents required at the preliminary design and data deadline, which will be judged by a panel of safety professionals; plans for a safety information page that will be on the H-Prize website; and plans to hold a webinar on safety, codes and standards that will be open to all interested parties and posted on the H-Prize website. In addition to the eligibility requirement included in both the draft and final guidelines that participants would be disqualified for any “violation of any federal, state or local law or regulation” which includes safety codes and standards, the final guidelines require that “entries must meet the safety codes and standards in effect at the installation location appropriate to the system.” Because the relevant safety codes and standards will depend on both the system design and the installation location, a single, comprehensive list of required standards cannot be provided. Some suggestions by respondents were more appropriate for projects where DOE was providing direct funding for a contract or financial assistance award. Unlike traditional funding scenarios, the H-Prize competition does not create a direct contractual relationship with potential H-Prize contestants.

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